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The question of an inverse functor

In the setting of von Neumann algebras, with separable predual, a complete invariant in the amenable case is given by the Connes-Takesaki flow of weights. A functor in the opposite direction, from flows to von Neumann algebras, was constructed by Sutherland and Takesaki and Wong. It is an interesting question to try to do this for C*-algebras. Even for AF algebras very few results are known—but those that are known are very interesting.

Recently, in joint work with Niu, a canonical construction was discovered of the AF algebra with K_0-group that of the irrational rotation C*-algebra. Namely, one can construct it from the rotation algebra, in a canonical way as opposed to the embedding constructed by Pimsner and Voiculescu. (It is canonical, for instance, with respect to unital mappings between the K_0-groups for different irrational numbers.)